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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/550,757	04/17/2000	Steven T. Jaffe	34040/NEC/B600	1171

23363 7590 05/27/2005

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EXAMINER	
LUGO, DAVID B	

ART UNIT	PAPER NUMBER
2637	

DATE MAILED: 05/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/550,757	JAFFE ET AL.	
	Examiner	Art Unit	
	David B. Lugo	2637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *30-36,38-46,48,49 and 60-67* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *30-36,38-46,48,49 and 60-67* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/28/05 has been entered.

Response to Arguments

2. Applicant's arguments filed 4/28/05 have been fully considered but they are not persuasive. Regarding claims 40 and 60, Applicant argues that the cited references do not disclose the amended claim limitation: "when in transmission mode, the plurality of tap coefficients of the decision feedback filter gradually decrease in value as the plurality of tap coefficients of the precoder increase in value mitigating the need for the decision feedback filter to perform decision feedback filtering." The Examiner respectfully disagrees.

In response, the Examiner notes that Langberg et al. disclose that "[c]onverter 130 is designed to slowly change the current set of precoder values to the new set of precoder values by periodically incrementing each current precoder value a small amount until the new precoder value is reached" and "[s]lowly incrementing the precoder values enables the ISI filter 64 to track the updating of the precoder values. As the precoder values are slowly updated, the quality of the signals received by receiver slowly improves, and, in response, ISI filter 64 is designed to slowly reduce the values of its equalizer coefficient values" (see col. 5, lines 13-23). Langberg et al. disclose that this takes place during the communication phase as indicated in column 5, line

61 to column 6, line 14, and that the transmitter is "configured to adaptively update the precoder values without the occurrence of a retrain" (col. 4, lines 57-61). Further, Langberg et al. disclose, "if the communications channel remains constant for the transmission period, no further adaptation is required since the precoding is equivalently performing the feedback function." (col. 4, lines 20-24). Thus, need for the decision feedback filter to perform decision feedback filtering is mitigated, and Langberg et al. is considered to teach the claim limitation.

In response to applicant's argument regarding claims 40 and 60 that the examiner has combined an excessive number of references, reliance on a large number of references in a rejection does not, without more, weigh against the obviousness of the claimed invention. See *In re Gorman*, 933 F.2d 982, 18 USPQ2d 1885 (Fed. Cir. 1991).

Further regarding claim 30, Applicant argues that Langberg et al. in combination with Takatori and Gadot do not disclose the amended claim limitation: "wherein when in transmission mode, the plurality of tap coefficients of the decision feedback filter gradually decrease in value as the plurality of tap coefficients of the precoder reach their final value, the corresponding tap coefficients of the decision feedback filter will be at a corresponding final value of zero mitigating the need for the decision feedback filter to perform decision feedback filtering." The Examiner respectfully disagrees.

In response, for reasons similar to those described above, Langberg et al. is considered to disclose the limitations: "in transmission mode, the plurality of tap coefficients of the decision feedback filter gradually decrease in value as the plurality of tap coefficients of the precoder reach their final value" and "mitigating the need for the decision feedback filter to perform decision feedback filtering." The portion of claim 30 cited by Applicant not expressly disclosed

by Langberg is that when the equalizer coefficient values are reduced upon the precoder values being updated to their final value, the equalizer coefficients will be at a corresponding value of zero. However, the general purpose of a precoder is to mitigate the error propagation at the receiver, as explained by Langberg et al. in column 1, lines 20-27. The precoding in the transmitter equivalently performs the feedback function of the equalizer (col. 4, lines 20-24). Thus, when the receiver transmits its equalizer coefficients to the transmitter across a data channel 119 (col. 6, lines 2-4), the precoder uses those coefficients to perform the equivalent function to that previously performed by the equalizer, and the receiver reduces its coefficients accordingly (col. 6, lines 13-23). When the precoder coefficients are completely updated, by the adaptive nature of the equalizer, the coefficients of the equalizer will be at a value of zero, since the effects of the channel are now compensated at the precoder. Gadot et al. is introduced to expressly indicate that the coefficients in the equalizer can be at a level of zero when the channel is compensated at the precoder upon updating its coefficients according to tap values transmitted from the equalizer. Gadot et al. is not relied upon to introduce the teachings of a retrain, as the invention of Langberg provides for precoder updates without the use of a retrain, as explained above.

Accordingly the rejection of claims 30-36, 38-46, 48, 49 and 60-67 is maintained.

Claim Objections

3. Claim 49 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 48. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 30-36, 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Langberg et al. U.S. Patent 6,243,425 in view of Gadot et al. U.S. Patent 5,513,216.

Regarding claim 30, Langberg et al. disclose a ramping circuit in Figure 6 comprising an input port configured to receive equalizer coefficient values from a decision feedback filter (ISI filter 64) over channel 119, and a coefficient ramping circuit (130) for providing a new set of precoder values for precoder (94) based on the received equalizer coefficient values by slowly changing the current set of precoder values (first values) to the new set of values (second values), periodically incrementing each current precoder value a small amount, and outputting information representative of the ramped output to the precoder (94) via an output port. Langberg et al. disclose that the coefficient values are clamped as they are prevented from reaching values that result in error propagation (col. 5, lines 23-26). Langberg et al. further disclose that the precoder coefficients are ramped during the communication phase (see col. 5, line 61 to col. 6, line 14), where as the precoder values are slowly updated, the decision feedback equalizer filter coefficients gradually decrease in value (col. 4, line 63 to col. 5, line 26). In addition, Langberg et al. state, "if the communications channel remains constant for the transmission period, no further adaptation is required since the precoding is equivalently performing the feedback function." (col. 4, lines 20-24). Thus, need for the decision feedback filter to perform decision feedback filtering is mitigated.

Langberg et al. state that the decision feedback equalizer coefficients are reduced as the precoder values are updated (col. 5, lines 13-23). Further, it is a property of DFEs, according to their adaptive nature, to drive the coefficients to zero when the channel is being compensated at the precoder (col. 4, lines 20-24; col. 5, lines 18-23; col. 6, lines 23-27). However, Langberg et al. do not expressly state that they will be at a corresponding final value of zero.

Gadot et al. disclose a transmission system where a transmitter precodes a transmission signal, and a receiver provides decision feedback equalization where when the precoder coefficients are fully updated, the receiver coefficients are at a corresponding value of zero (col. 10, line 11).

It would have been obvious to one of ordinary skill in the art to provide the decision feedback coefficients at a value of zero, as taught by Gadot et al., in the system of Langberg et al., in order to allow adaptation to begin from an initial starting point as the precoder is now compensating for the channel conditions that were being compensated for by the previous DFE coefficients.

6. Regarding claim 31, Langberg et al. disclose that the current precoder values are slowly changed to the new set of precoder values by incrementing by a small amount (see col. 5, lines 13-17).

7. Regarding claim 32, Langberg et al. disclose that the current precoder values are incremented until they reach the calculated new set of precoder values (col. 6, lines 11-14).

8. Regarding claims 33-35, Langberg et al. disclose a ramping circuit that provides a ramped output varied over time from a first value to a second value, as described above, but do not expressly state whether the output is ramped linearly or non-linearly. However, one of

ordinary skill in the art would recognize that the output in the ramping circuit of Langberg et al. must be ramped either linearly or non-linearly (i.e. exponentially). Selection of the ramping to be either linear or to exponential is deemed a design consideration that fails to patentably distinguish over the prior art of Langberg et al.

9. Regarding claim 36, the ramping circuit 130 receives the coefficients over channel 119.

10. Regarding claim 38, Langberg et al. in combination with Takatori et al. disclose a ramping circuit included in a transceiver as described above, and further teach that the ramping circuit 130 receives the coefficients over channel 119 used in a modem in a communications transceiver. Langberg et al. do not expressly state that the transceiver is a DSL transceiver. However, DSL transceivers are well known in the art. It would have been obvious to one of ordinary skill in the art to implement the ramping circuit of Langberg et al. in a DSL system to take advantage of the utilization of the existing telephone wiring used in DSL networks.

11. Regarding claim 39, Langberg et al. in combination with Takatori et al. disclose a ramping circuit as described above, and further teach that the ramping circuit 130 receives the coefficients over channel 119, and is considered to define part of the transmitter associated with the precoder. Langberg et al. do not expressly state that the transmitter is a DSL transmitter. However, DSL transmitters are well known in the art. It would have been obvious to one of ordinary skill in the art to implement the ramping circuit of Langberg et al. in a DSL system to take advantage of the utilization of the existing telephone wiring used in DSL networks.

12. Claims 40-46, 48, 49 and 60-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Langberg et al. U.S. Patent 6,243,425 in view of Morton et al., "Run-Time Precoder Updates for HDSL2" and Turner U.S. Patent 5,414,733.

13. Regarding claims 40 and 60, Langberg et al. disclose data communications equipment (DCE) 14 (see Fig. 5) comprising a receiver 16 having a DFE 35 (col. 5, lines 64-66), where DFE 35, shown in Figure 2, includes a feedforward filter 49 and a decision feedback filter (ISI filter 64) coupled to the feedforward filter, the data communications equipment further comprising a transmitter 15 having a precoding system 120, which includes a precoder 94 and a ramping circuit as shown in Figure 6, wherein the ramping circuit receives equalizer coefficient values from a decision feedback filter from a remote transceiver at an input port, and includes a coefficient ramping circuit (130) for determining a new set of precoder values for precoder 94 based on the received equalizer coefficient values by slowly changing the current set of precoder values (first values) to the new set of values (second values), periodically incrementing each current precoder value a small amount, and outputting information representative of the ramped output to the precoder (94) via an output port. Langberg et al. disclose that the coefficient values are clamped as they are prevented from reaching values that result in error propagation (col. 5, lines 23-26). Langberg et al. further disclose that the precoder coefficients are ramped during the communication phase (see col. 5, line 61 to col. 6, line 14), where as the precoder values are slowly updated, the decision feedback equalizer filter coefficients gradually decrease in value (col. 4, line 63 to col. 5, line 26). In addition, Langberg et al. state, "if the communications channel remains constant for the transmission period, no further adaptation is required since the precoding is equivalently performing the feedback function." (col. 4, lines 20-24). Thus, need for the decision feedback filter to perform decision feedback filtering is mitigated.

Langberg et al. do not expressly disclose that the ramping circuit is included in the receiver and transmits information representative of the ramped output to a precoder of a remote transceiver via a communication channel.

Morton et al. disclose in Figure 1 (page 2), an adaptation algorithm included in part of a receiver for computing coefficients for the equalizer in the receiver and differential precoder coefficients and transmitting the precoder coefficients to a precoder of a remote transmitter.

It would have been obvious to one of ordinary skill in the art to incorporate the teaching of calculating precoder coefficients in an adaptation unit also used to calculate coefficients of an equalizer comprised in a receiver, and transmit those precoder update coefficients to a transmitter comprising the precoder, as suggested by Morton et al., in the device of Langberg et al. in order to reduce the bandwidth requirement as stated by Morton et al. in page 4, section 4.

Further, Langberg et al. do not expressly disclose that the feedforward filter includes a plurality of taps, a reference tap located proximate a center position of the filter having a coefficient value greater than the coefficients of the other filter taps.

Turner discloses a decision feedback equalizer having a feedforward filter with a reference (cursor) tap a number K tap stages from the end of the filter, broadly considered to be proximate a center position of the filter (Fig. 4), where the cursor tap is the tap with the largest coefficient (col. 6, line 63 to col. 7, line 4).

It would have been obvious to one of ordinary skill in the art to employ a feedforward filter as taught by Turner in the DFE of Langberg et al. for improved error rate performance, as stated by Turner in col. 14, lines 10-22.

14. Regarding claims 41 and 61, Langberg et al. disclose that the current precoder values are slowly changed to the new set of precoder values by incrementing by a small amount (see col. 5, lines 13-17, eq. 1 – col. 5, line 31).

15. Regarding claims 42 and 62, Langberg et al. disclose that the current precoder values are incremented until they reach the calculated new set of precoder values (col. 6, lines 11-14).

16. Regarding claims 43-45 and 63-65, Langberg et al. disclose a ramping circuit that provides a ramped output varied over time from a first value to a second value, as described above, but do not expressly state whether the output is ramped linearly or non-linearly. However, one of ordinary skill in the art would recognize that the output in the ramping circuit of Langberg et al. must be ramped either linearly or non-linearly (i.e. exponentially). Selection of the ramping to be either linear or to exponential is deemed a design consideration that fails to patentably distinguish over the prior art of Langberg et al.

17. Regarding claim 46, the ramping circuit 130 receives the coefficients over channel 119.

18. Regarding claims 48, 49 and 66, Langberg et al. in combination with Morton et al. disclose a ramping circuit included in a receiver as described above, but do not expressly state that the receiver is a DSL receiver. However, DSL receivers are well known in the art (see Turner). It would have been obvious to one of ordinary skill in the art to implement the ramping circuit of Langberg et al. in a DSL system to take advantage of the utilization of the existing telephone wiring used in DSL networks.

19. Regarding claim 67, Langberg et al. in combination with Morton et al. and Takatori et al. disclose a receiver included in a transceiver as described above, where in the combination, the ramping circuit transmits information representative of the ramped output to the precoder.

Langberg et al. do not expressly state that the transceiver is a DSL transceiver. However, DSL transceivers are well known in the art (see Turner). It would have been obvious to one of ordinary skill in the art to implement the ramping circuit of Langberg et al. in a DSL system to take advantage of the utilization of the existing telephone wiring used in DSL networks.

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Langberg et al. U.S. Patent 5,852,630 disclose a precoding system used in DSL networks.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David B. Lugo whose telephone number is 571-272-3043. The examiner can normally be reached on M-F; 9:30-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Lugo
5/24/05

KHAI TRAN
PRIMARY EXAMINER